

The Pesticide Tradeoff

JUL 06 1981

WITHDRAWN

What are the risks? What are the benefits?



PHOTO COURTESY OF THE SASKATCHEWAN COOPERATIVE FALCON PROJECT

"Lila," a three-year-old captive bred peregrine falcon. This bird was hatched at the Western College of Veterinary Medicine as part of an

effort to reintroduce the peregrine falcon in regions where it no longer breeds. (See A fable for tomorrow, page 2)

Why a paper on pesticides?

by Ted Bowerman, Minister of Environment

THE USE of chemical pesticides has been the subject of intense investigation and controversy throughout 1980. The controversy has grown with the discovery that a number of chemicals in use throughout Canada were improperly and fraudulently tested. Adding to the controversy is the growing body of information that many chemical pesticides are far more harmful to health and the environment than was once thought.

Saskatchewan has an agriculturally-based economy. It depends heavily on the produce of farming for its wealth. To obtain greater yields and higher quality produce, farmers use a vast array of agricultural chemicals — fertilizers, herbicides, insecticides, rodenticides, fungicides, and growth regulators, to name but a few. Saskatchewan farmers are one of the heaviest users of pesticide chemicals in Canada. Eight pounds of pesticides per person is used annually in Saskatchewan.

With the amount of pesticides in use in Saskatchewan, and the questions that are being raised about their use, it is an opportune time for teachers, students and concerned individuals to investigate this issue.

This paper supplies data on various aspects of the issue. It examines the background and historical information, the impact of pesticides on life, pesticide standards and regulation, the range of perspectives on the issue, and the choices that can be made as well as the consequences of those decisions.

This paper provides a framework from which to begin an inquiry into the pesticide issue. More detailed information on the issue can be obtained by thorough research of other resources.

Saskatchewan Environment has prepared this paper in the hope that the study of this issue will help Saskatchewan teachers, students and concerned individuals make well-informed

judgements and decisions concerning chemical pesticides.



Honourable Ted Bowerman

SASKATCHEWAN PHOTO ARTS DEPARTMENT

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Saskatchewan Environment,
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Ted Bowerman,
Minister.

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Introduction

A fable for tomorrow

Excerpted from *Silent Spring* by Rachel Carson, 1962
by Rachel L. Carson. Reprinted by permission of the
Houghton Mifflin Company, Boston.

by Rachel Carson

THERE WAS once a town in the heart of America where all life seemed to live in harmony with its surroundings. The town lay in the midst of a checkerboard of prosperous farms, with fields of grain and hillsides of orchards where, in spring, white clouds of bloom drifted above the green fields. In autumn, oak and maple and birch set up a blaze of color that flamed and flickered across a backdrop of pines. Then foxes barked in the hills and deer silently crossed the fields, half hidden in the mists of the fall mornings.

Along the roads, laurel, viburnum and alder, great ferns and wildflowers delighted the traveler's eye through much of the year. Even in winter the roadsides were places of beauty, where countless birds came to feed on the berries and on the seed heads of the dried weeds rising above the snow. The countryside was, in fact, famous for the abundance and variety of its bird life, and when the flood of migrants was pouring through in spring and fall people traveled from great distances to observe them. Others came to fish the streams, which flowed clear and cold out of the hills and contained shady pools where trout lay. So it had been from the days many years ago when the first settlers raised their houses, sank their wells and built their barns.

Then a strange blight crept over the area and everything began to change. Some evil spell had settled on the community: mysterious maladies swept the flocks of chickens; the cattle and sheep sickened and died. Everywhere was a shadow of death. The farmers spoke of much illness among their families. In the town the doctors

had become more and more puzzled by new kinds of sickness appearing among their patients. There had been several sudden and unexplained deaths, not only among adults but even among children, who would be stricken suddenly while at play and die within a few hours.

There was a strange stillness. The birds, for example — where had they gone? Many people spoke of them, puzzled and disturbed. The feeding stations in the backyards were deserted. The few birds seen anywhere were moribund; they trembled violently and could not fly. It was a spring without voices. On the mornings that had once throbbed with the dawn chorus of robins, catbirds, doves, jays, wrens, and scores of other bird voices there was now no sound; only silence lay over the fields and woods and marsh.

On the farms the hens brooded, but no chicks hatched. The farmers complained that they were unable to raise any pigs — the litters were small and the young survived only a few days. The apple trees were coming into bloom but no bees droned among the blossoms, so there was no pollination and there would be no fruit.

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In the gutters under the eaves and between the shingles of the roofs, a white granular powder still showed a few patches; some weeks before it had fallen like snow upon the roofs and the lawns, the fields and streams.

No witchcraft, no enemy action had silenced the rebirth of new life in this stricken world. The people had done it themselves

What do you know about the pesticide issue?

Complete the following opinionnaire using the following code of Strongly Agree (SA), Agree (A), Undecided (U), Disagree (D), and Strongly Disagree (SD). Note your opinions by checking the appropriate box. At the end of the newspaper re-check your opinions to see if they have changed.

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2. It is more important for Saskatchewan agriculture to use pesticides to increase significantly the production of the best cash crops than to diversify the agricultural crops and rely on more natural control of pests. ☐ ☐ ☐ ☐ ☐
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4. It is more important to me to kill all mosquitoes, flies and bugs that harm man than to let nature exert most of the control. ☐ ☐ ☐ ☐ ☐
5. Increased pesticide use leads to pesticide resistance. ☐ ☐ ☐ ☐ ☐
6. The result of continued pesticide use will be to poison the environment, food, and eventually humankind. ☐ ☐ ☐ ☐ ☐
7. The few birds, animals, and plants accidentally killed by overdoses of pesticides are not as important as the food increases, disease-prevention and comfort benefits for mankind. ☐ ☐ ☐ ☐ ☐
8. We should continue to use DDT to kill the Anopheles mosquitoes — carriers of malaria. ☐ ☐ ☐ ☐ ☐
9. Only a government agency should be able to distribute and sell pesticides. ☐ ☐ ☐ ☐ ☐
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12. The Saskatchewan government should drastically restrict the use of all pesticides. ☐ ☐ ☐ ☐ ☐
13. The Saskatchewan government should continue to permit the use of the best pesticides available, whenever the need arises. ☐ ☐ ☐ ☐ ☐
14. The testing and regulation of pesticides is adequate. ☐ ☐ ☐ ☐ ☐

For further research and study

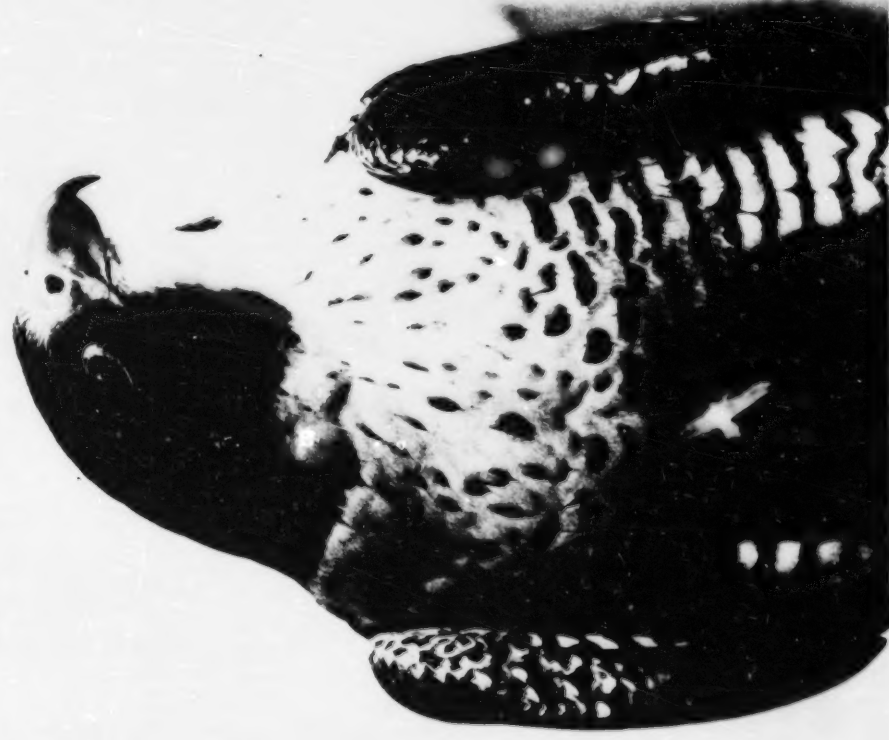
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Suggestion: Invite a local naturalist or conservation officer to speak to the class on the disappearance of certain wildlife species.

Question: What are the above articles concerned with? In a brief paragraph identify and describe the problem. Your answer should outline the various aspects of the problem. How does this problem affect you?

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Suggestion: Check the glossary on page 12 for the meaning of words set in bold face.



Peregrine Falcon—near extinction in Saskatchewan.

PHOTO COURTESY OF THE SASKATCHEWAN COOPERATIVE FALCON PROJECT

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For further research and study

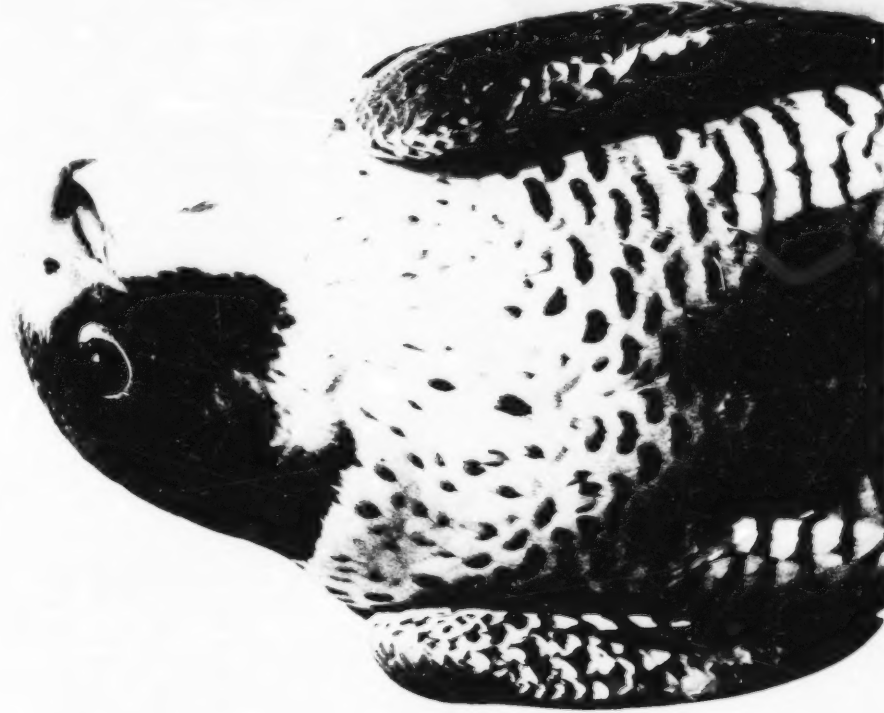
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Background

This section provides information on the nature of pesticides, their historical development, and the extent of their use.

What are

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"any substance, designated in the regulations, that is intended, sold or presented for use in preventing, destroying, repelling or mitigating any insect, nematode, rodent, predatory animal, bacteria, fungus, weed or other form of plant or animal life or virus."

Put simply, a pest can be a weed, an insect, a fungal disease, or an animal that is troublesome or harmful to human or property.

Some highlights in pesticide development

900 B.C. — writings of Homer refer to "pest-averting sulphur."

200 B.C. — fumes of mineral pitch used to protect vineyards.

— use of hellebore, a plant extract to control human lice.

1600s — arsenic used to control garden pests in Europe.

1700s — copper sulfate, lye, mercuric chloride, petroleum oils, phosphorous, sulfur and strychnine introduced as pest control agents.

1731 — Jethro Tull introduces word weed in its present spelling and meaning.

1867 — Paris green was used for the first time to protect a commercial potato crop from the Colorado potato beetle.

1874 — DDT discovered, but shelved.

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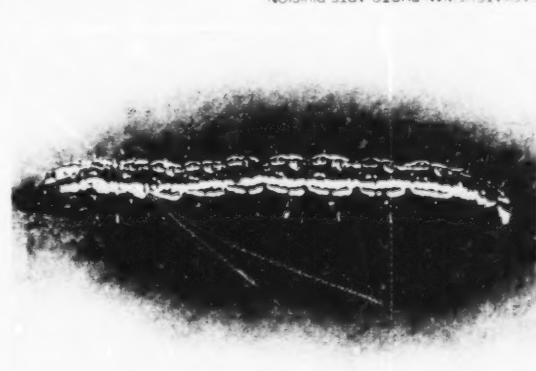
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1951 — Captain introduced by Chevron.

1957 — Captain, considered a "miracle fungicide" used to protect fruits, ornamentals, and vegetables.

1970s — there are some 1400 active ingredients used in over 10,000 different pesticide products.



The bertha army worm attacks broad-leaf plants.

SASKATCHEWAN PHOTO ARTS DIVISION

Agricultural pesticides commonly used in Saskatchewan

Trade names	Common name	Type of Pesticide
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MCPA	MCPA	Herbicide
AVADEN BW	TRIALATE	Herbicide
TRIFLAN	TRIFLURALIN	Herbicide
BAVEL	DICAMBA	Herbicide
BUTHIL M		
BROMINAL M	BROMOXNYL	Herbicide
TORCH PARDNER		
CARRYNE	BARBAN	Herbicide
WYFOUT		
CYGOON	DIMETHOATE	Insecticide
HOPPER SPRAY		
CYTHON	MALATHION	Insecticide
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HOE GRASS	DICLOFOP-METHYL	Herbicide
STAMPEDE	PROPANIL	Herbicide
STAMPEDE CN		
AVENGE	DIFENZOQUAT	Herbicide

Excerpted from *The Pesticide Manual*, printed and published by The British Pesticide Press.

by Peter von Stackelberg

THE USE of chemicals to battle the multitude of pests that attack food crops has increased dramatically in North America since the 1940s.

Millions of pounds of pesticides are now spread on agricultural land and on crops throughout Canada each year. Several million more pounds are sprayed on forests, gardens, lawns and in homes. In the U.S. more than one billion pounds of pesticides are used each year.

The amount of pesticide used in North America has doubled in the past decade, a 1979 report from the U.S. Congress Office of Technology Assessment notes. Since the introduction of the major synthetic organic pesticides in the 1940s, pesticide use has increased twelvefold.

It is a big business, with more than \$250 million in sales in Canada annually, according to the Canadian Agricultural Chemicals Association (CACA).

But exactly how many pounds of pesticides are used, and where they are used, is difficult to determine. The most recent comprehensive set of figures on pesticide sales was compiled in 1977 by Statistics Canada. No figures have been gathered since that time, because the federal agriculture department was no longer willing to sponsor the costs of collecting and compiling the data, an official with Statistics Canada told the *Leader-Post*.

Even those figures gathered by Statistics Canada have gaps because of the regulations protecting information about sales by specific companies.

In the last three years the value of pesticides sold has climbed by about \$60 million, from \$191 million in 1977 to the \$250 million now estimated by CACA. While representatives of the chemical industry argue that curtailing the sales of pesticides would have a severe impact on agricultural production, figures show the use of pesticides could be cut by at least

15 per cent without even touching agricultural uses. Statistics Canada figures from 1977 show that home and garden and industrial users of pesticides make up about 15 per cent of total sales. These uses accounted for sales of about:

- 1.6 million pounds of pesticides used as fumigants;
- 1.7 million pounds of insecticides used in the home and garden;
- 92,000 pounds of insecticides used on pets;
- 1.8 million pounds of herbicide used on lawns and gardens;
- 1.6 million individual no-pest type insecticide strips;
- 950,000 cans of spray insecticide, herbicide and fungicide; and
- 759,000 pounds of poison baits for insects and rodents. This does not include the 1.2 million pounds of poison used against rats and mice and classified under agricultural uses.

In all, these products accounted for nearly \$30 million in sales in 1977.

But the big use was agriculture — with sales totalling \$162 million in that year.

All those pesticides were not used in the production of food, however. Included in the agricultural figures were sales of insecticides, herbicides and fungicides used in spraying forests, parks, playgrounds, golf courses and a number of other large, non-agricultural uses.

Saskatchewan is one of the heaviest users of pesticides in Canada, primarily herbicides for weed control in fields. It uses nearly as much herbicide as Alberta, Manitoba and British Columbia combined.

In 1979 more than 8.3 million pounds of herbicides were sold for agricultural use in Saskatchewan, according to survey conducted by the Manitoba agriculture department. Nearly 65 per cent of that was 2,4-D and another 15 per cent was MCPA.

The other three western provinces combined used a total of just over 8.7 million pounds of herbicides, the survey found

For further research and study

CONSIDER: Many scientists and conservationists think that the term pesticide is misleading, and that a new term, biocide, would more adequately describe the chemicals. Can you think why the term biocide is more appropriate? SUGGESTION: A wide variety of household cleaners and other chemicals are generally found in every home. Check your home for chemical products. Prepare a chart, for the week, month, or year, which outlines the chemicals used by your family. Do you find that some chemicals are only used at certain times of the year? Compare your chart with others. Which chemicals are used most extensively? Could any of the pesticides used be substituted with some form of non-chemical pest-control?

CONSIDER: Pesticides are generally classified according to the type of organism they are principally intended to control. What types of pests are controlled by the following: insecticide, fungicide, herbicide, and rodenticide? Enquire into the use of pesticides within your area. Is the control aimed at agricultural, recreational, home or garden pests? SUGGESTION: The above chart outlines the ten most commonly used chemical pesticides in Saskatchewan agriculture. Try to identify the pest or pests controlled by each, and determine the precautions and disposal methods which should be followed. CONSIDER: The first major pesticide to be utilized was DDT, which came into wide-spread use in the late 1940s. It had the positive effects of controlling weeds and insects and of greatly diminishing diseases such as malaria. However, even though DDT has not been used in recent years, some of its negative effects may be with us for years to come. What are some of the negative effects?

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Chemical warfare against bugs is big business

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CYTHION	MALATHION	Insecticide
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HOE-GRASS	DICLOFOP-METHYL	Herbicide
STAMPEDE CM	PROPANIL	Herbicide
AVENGE	DIFENZOQUAT	Herbicide

Pesticide Impact

Since their development, pesticides have been used for disease and pest control, but not each and every pesticide is completely safe all the time. Pesticide uses, their side effects and impact on non-target species is examined in this section.

Use of pesticides in agriculture

Excerpted from *Pesticides, Agriculture and the Environment*, Agricultural Institute of Canada, 1981

THE NEED for pesticides in agriculture varies widely among different crops because of the nature of pest injury and the degree to which crop losses would occur if the pests were not controlled. Thus, in apples, insecticides and fungicides are essential since the fruit is attacked by five major insect pests and several diseases. Without control, the apple maggot and codling moth would infest virtually 100% of the fruits and, for most varieties, apple scab would render the fruits unmarketable. Equally severe pest damage occurs with such other fruits as peaches, pears and sour cherries and with such vegetables as cabbage, rutabaga, cauliflower, broccoli and carrots. A different situation exists for such crops as onions and beans which would not survive as seedlings without the use of pesticides. In contrast to these, other pests may act to reduce crop yield without great effect on quality or the marketability of the product. This is true for insects and diseases which attack many of the cereal and field crops used for livestock feed and with many of the insect pests which feed on the foliage of potatoes. To a large extent, this yield loss is the main effect when weeds infest crops although weed seeds are important as contaminants in cereal, forage and some other crops and heavy growths of weed may prevent efficient use of mechanical harvesters.

Because of the diversity of agricultural crops grown in Canada, the differences in the types of damage caused and the different pests, the need for pesticides varies widely from one region to another. In fruit and vegetable production, fungicides and insecticides are required to produce marketable crops and herbicides provide an important method of weed control when included with tillage practices. For example, our present high yields of potatoes are possible because the Colorado potato beetle, the potato flea beetle and potato leafhopper are controlled with insecticides. Aphid control with insecticides reduces virus infections and helps maintain Canadian seed potatoes as important export items as well as satisfying the domestic market. Fungicides now control early blight and the late blight fungus which can destroy the crop as occurred in Ireland in the mid-19th century. Herbicides, too, play a role since they eliminate weed competition more effectively than does tillage along with the added benefits of reduced energy consumption and increased moisture conservation. The net result is that effective use of pesticides combined with improved varieties has, for example, tripled the yield of potatoes in Ontario

during the past 30 years.

In contrast to potatoes, there is quite a different situation in cereals. In most of these crops, insecticides and fungicides are used only as seed protectants to protect the developing seedling. Beyond that, except for outbreaks of grasshoppers or armyworms where insecticides become essential, the main pesticides used are herbicides. These herbicides not only provide weed control but, especially in Western Canada, help conserve moisture.

Serious weed problems were encountered soon after the land was cultivated in the late 1800s. Many introduced weeds were pre-adapted to thrive under monoculture conditions.

During the 1920s and 1930s, in spite of much effort, little headway was made toward controlling weeds through summer fallow and cropping practices. Thus in 1947, 2,4-D, the first really successful herbicide for control of broad-leaved weeds in cereals, was accepted enthusiastically. The importance of the discovery of 2,4-D in terms of reducing competition from weeds can be placed in perspective when we realize that one plant of wild mustard has the nitrogen, phosphorus and moisture requirements of two oat plants. More recent developments in herbicides have resulted in the discovery of compounds to control wild oats, the number one weed problem in western Canada. In 1978, more than 6.5 million hectares were treated for wild oats. Today, herbicides are used extensively in crop production and weeds in most crops can be controlled.

In addition to their role in reducing annual weed losses, herbicides help stabilize production through moisture conservation especially in the semi-arid prairies. With large machines allowing timely cultivation and seeding and with herbicides to control weeds, farmers can make maximum use of the limited moisture available. Yields are not only higher but risk of crop failure has been greatly reduced.

Other benefits from herbicide use are also important. It takes less energy to make and apply the herbicide than to cultivate the soil. Crop residues can be left on the surface for protection against erosion. Standing stubble will trap snow to retain moisture and possibly reduce the need for summer-fallow. Pastures and rangeland can be reseeded without cultivation when herbicides are used to kill the existing vegetation. This too conserves energy and reduces the chances of erosion.

Thus, herbicides continue to play an integral part in crop production. They not only reduce annual crop losses caused by weeds but conserve energy, reduce erosion and help maintain the productivity of the soil. . . .



Wheat fields north of Regina

Use of pesticides for disease control

Excerpted from *Pesticides: Hopes or Villains?* Weed Control Notes, Saskatchewan Department of Agriculture

1. PESTICIDES save millions of lives each year by destroying insect vectors that transmit such diseases as malaria, typhus, and yellow fever, to name a few. A little over 20 years ago about 200 million people were stricken with malaria annually, with 2 million deaths resulting. Now about 40% of the world population lives in malaria free areas and another 39% lives in areas protected by active DDT control programs.

In 1953 there were 75 million cases of malaria in India, and life expectancy for Indians was 32 years. By 1962, 147 million pounds of DDT has been used, and life expectancy had jumped to 47 years. By 1967, there were

fewer than 100,000 cases of malaria in India. . . .

2. Much land has been made fit for human habitation by disease control or eradication. In Ceylon, for example, control of malaria was followed by migration from the crowded third of the island to what had been the malarious two-thirds. The result was development of that fertile part of the country. . . .

Another example is Nepal where thousands of acres are now being cultivated that were practically untouched before malaria control activities were begun. Since 1961, in central Nepal alone, some 21,000 acres of land have been opened for greatly increased farm production in formally malarious areas. . . .

Pesticide blamed for illness

Reprinted from the *Prince Albert Herald*, October 6, 1980

REGINA (CP) — An Alberta couple visited 17 doctors before finding out their weakness and headaches had been caused by a pesticide sprayed on an apple tree, a symposium on family medicine was told Saturday.

Dr. Stanley Greenhill, chairman of the department of community health at University of Alberta, used the story to illustrate that physicians and members of the public are generally unaware of the potency of many pesticides being used in Canada.

Insecticides of the organophosphate group, including parathion, malathion, and diazinon, are variations of military nerve gases, Greenhill said.

"I would like to see every bottle labelled as such," he said.

The chemical dimethoate, also known as Cygon, was behind the problems of the Alberta couple. Their flushed skin, weakness and headaches were originally diagnosed as the result of various

psychological and physical conditions.

Some can kill

A chemical such as paraquat would have been more dangerous.

"If paraquat is ingested or inhaled, death is the result," Greenhill said. "There is no known antidote."

He emphasized the importance of following label directions, proper storage and disposal methods and wearing protective clothing.

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Housewives, for example, could be at risk from a wide variety of household cleaners, other chemicals, and even dust in the air.

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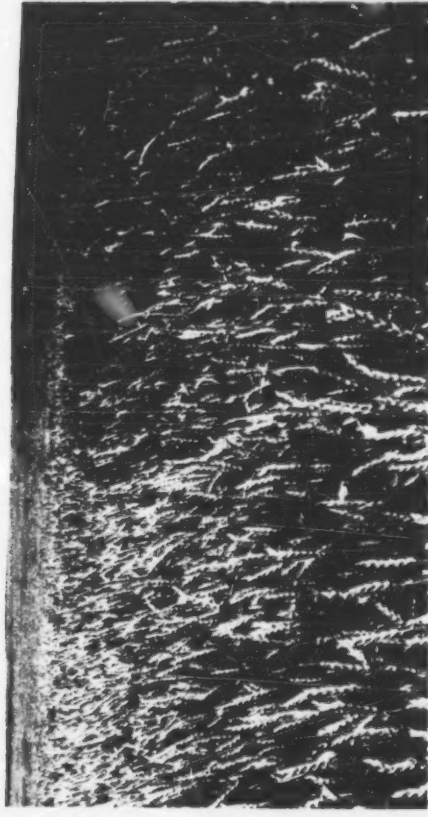
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SASKATCHEWAN PHOTO ARTS DIVISION

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All prairie wildlife in government study found to contain chemical traces

Excerpted from *The Moose Lake Post-Herald*, Jan. 2, 1980.

WINNIPEG (CP) — A 1979 study by Environment Canada showed that virtually every animal, fish and bird tested in the Prairie provinces contained traces of manufactured chemicals.

The study, which didn't differentiate between pesticides and

herbicides, also said that ground and surface water were contaminated with chemicals such as 2,4-D and its killing cousin, 2,4,5-T.

Whether this is a situation Prairie residents should worry about was left unanswered but the study team advised continued monitoring.

Study says 2,4,5-T causes difficulties

Excerpted from *The Regina Leader-Post*, February 6, 1980.

WASHINGTON (AP) — A NEW STUDY says the herbicide 2,4,5-T — previously linked to miscarriages — causes learning difficulties in baby chickens exposed before birth, indicating an added potential human risk.

The Australian research indicates the herbicide causes noticeable behavioral effects at doses lower than people are exposed to during normal use of 2,4,5-T.

This chemical, a component of the controversial herbicide Agent Orange, was one of the most widely used weed killers in the U.S. for 30 years.

Pest resistance to pesticides

Excerpted from *Pesticides: Agriculture and the Environment*, Agricultural Institute of Canada Inc.

ONE OF THE main problems in pest control in Canada, as elsewhere throughout the world, is the ability of pests, whether they be insects (including mites), pathogens, weeds or rodents, to develop resistance to pesticides. This is not a new phenomenon. It occurred with hydrogen cyanide and scale insects and with the arsenicals and the codling moth more than 50 years ago. The present situation however represents a near-crisis with insecticides and some fungicides. Added to this, is the fact that in recent years in some areas weed species formerly controlled with atrazine have developed resistant strains.

When DDT was introduced for housefly control in the late 1940s, its effectiveness was phenomenal. Within a few years, however, resistant strains of houseflies were reported in Italy and this was followed by similar reports from other parts of the world. This was but the beginning and now more than 350 species of insects are resistant to one or more insecticides which previously provided good control. About 250 of these species are agricultural pests....

Perhaps most striking and of

As the push for increased agricultural production continues, chemicals remain a fact of life for Western farmers and questions surrounding their use are becoming a fact of life for Western politicians.

Tests find defects in lake animal life

Excerpted from *The Regina Leader-Post*, Jan. 14, 1980.

by Peter von Stackelberg

TOXIC CHEMICALS from industry and agriculture are causing significant numbers of defects in some of the animal life in Tobin Lake, a federal study released in Regina on Tuesday said.

The high incidence of defects in one species of insect in the lake "indicates the impact of contaminants on the lake's ecosystem is substantial," the federal environmental protection service report said.

While the chemicals do not pose any immediate hazard to human health, they could be an indication of future environmental problems on the Prairies, several scientists who worked on the report said at a news conference....

"One of the things we are concerned about are the problems that will show up in subsequent generations of animals exposed to chemicals. We try to predict such long-term risks as birth defects, still births and miscarriages," Samoiloff said all the chemicals that cause defects have also been shown to cause cancer.

But Samoiloff noted that for the chemicals in Tobin Lake to pose a human health hazard at this time, a person would have to live in the lake sediments like a nematode....

For further research and study

Consider: Through food most Canadians are exposed to synthetic chemicals. It is estimated that 117 million pounds of additives, over five pounds per person are consumed annually; a figure that does not include sugar or salt. Find out what is in your food. Check the labels on several food products and make a list of the chemical additives. Would you be willing to eat food that was less perfect in appearance in exchange for food that was chemical free?

Suggestion: Research various pests in regard to their life cycles, reproduction, and eating habits to determine the best time and method for eradication.

Consider: The Canadian Wildlife Service reports that virtually all samples of Canada's wildlife analyzed during the past five years contained pesticide residues. You may be surprised to know that residues have been discovered in species that remain in the north year-round, such as the arctic lemming which seldom moves beyond a radius of a few hundred yards during its lifetime. Can you explain in a paragraph how pesticides could spread to such an extent?

Suggestion: Examine a pest problem. Pick a crop in Saskatchewan. List the pests. Which pesticides are being used?

Chemicals and Agriculture

by Ross Evans

RESEARCH DONE at the Experimental Farm at Indian Head over a 25-year (1947-72) period shows no build up of 2,4-D or harmful residues in the soil. There is considerable other documented research which comes to the same conclusion.

2,4-D is a broad spectrum chemical that is it provides control for a larger number of weeds, ranging from complete control in the case of mustard and stink weed, to moderate or slight suppression in the case of Canada Thistle. In recent years a number of chemicals which offer specific weed control have come onto the market. The weed out chemicals fall into this category. Chemicals for the control of cow cockle, wild millet and wild buckwheat also tend to be quite specific.

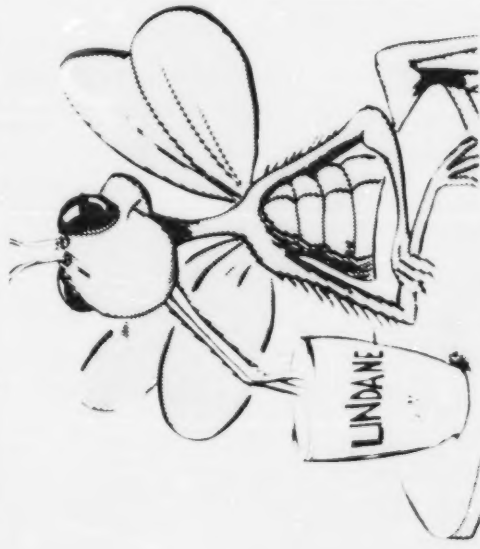
There are about 17,000,000 acres of wheat in Saskatchewan in a normal year of which about 75% is sprayed for broadleaf in any given year. In 1979 some 5,363,000 pounds of 2,4-D in various forms were used in Saskatchewan or roughly enough to treat 15 million acres. It is estimated that if the phenoxy herbicides, of which 2,4-D is the main one, were taken off the market, food production would drop 25-30% in the first year and could rise to 50% within five years. The dollar value of the wheat loss in Saskatchewan at present prices would be in the order of \$300,000,000 annually. Coupled with this there would be increased cultivation costs, higher dockage and the lower quality grain.

Why? Are there alternative pest control methods?

Consider: "Of the millions of pounds of pesticides used in Canada each year, much misses the target... In some applications as little as 25 per cent of the toxicants reach the target. This inefficiency is not only wasteful but can cause secondary health and environmental problems outside the target area." A number of plants and animals forming food chains of which man himself is a part have been seriously affected by the pesticides. Cite examples of the kinds of problems that have resulted. Define non-target species, teratogenic, mutagenic, and carcinogenic. Choose a particular chemical that you might have some contact with. How might it affect other plants and animals? What dangers are there in handling it? What precautions can be taken? Are there training programs available for those who handle or apply pesticides? Can we be totally safe from chemical exposure?

Consider: It now takes about 10,000 times more DDT to kill a housefly than it did in 1933. Can you explain why this might be so? What biological phenomenon is at work?

Question: If all chemical pesticides were banned, what would the effect be on developing countries?



Reprinted from *The Topic Most*, printed and published by The Regina Leader-Post, 1980.

All prairie wildlife in government study found to contain chemical traces

Excerpted from the *Moose Jaw Times-Herald*, June 21, 1980

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Perhaps most striking and of

greatest concern is the fact that pests resistant to one pesticide seem, in many cases, to be capable of developing resistance to others in a very short time. For example, houseflies resistant to organophosphorous and carbamate insecticides in one dairy barn were controlled with a new synthetic pyrethroid very effectively in 1978 but this same insecticide was ineffective in 1979. Thus the development of resistance raises two important considerations. The first is whether or not new pesticides will be available to provide control. The second is linked in a major way to the first and it involves the high cost of the testing required to determine if a pesticide is effective and safe to use. The treadmill of moving from one pesticide to another as resistance develops is very costly and the projected short life of each new pesticide offers little incentive to the pesticide industry to continue development of new compounds. With the current cost of approximately twenty million dollars to develop a new pesticide, it is unlikely that pesticide companies will develop new compounds without reasonable assurance of a large and sustained market. Pest resistance detracts from such assurance.



Reprinted from *The Toxic Mist*, printed and published by The Regina Leader-Post, 1980

Chemicals and Agriculture

Excerpted from a paper presented as an appendix to the S.A.R.M. brief to the Government of Saskatchewan on October 22, 1980

by *Ross Evans*

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Standards and Regulations

How they work

The question of pesticide control is a complex one, perhaps necessarily so as the potential impact on health, safety of workers, and the environment is so great. The following articles provide information on some of the many federal and provincial agencies involved in the regulation of pesticides.

Some articles debate whether or not these regulations are sufficiently strong. Others elaborate on the recent scandal which uncovered fraudulent testing of chemicals, and raise questions on whether or not the chemical industry should continue to conduct the testing of its own products.

Government role

Pest Control Products Act

Excerpted from *Pesticides: Their Implications for Agriculture*, Agriculture Canada, Publication 1518, 1973

PESTICIDES have long been closely regulated in Canada. Laws have been in force since 1927 to regulate the importation and sale of products used for the control of pests.

The sale of pesticides is regulated by the Pest Control Products Act, which is administered by the federal Minister of Agriculture. Consequently a significant portion of his departmental resources is devoted to research into the control of pests generally, including the use of chemicals and non-chemicals. This work is done in regional laboratories and stations across Canada, where special studies are made on the effects on the environment of the use of pesticides.

In addition to research, two regulatory laboratories analyze samples of products taken in the market place to assure compliance with registration, and to conduct investigations of various kinds for the purposes of the Pest Control Products Act and Regulations.

Pest control chemicals make up a commodity group that covers a wide range of products and uses. The administration of the P.C.P. Act take into account many disciplinary interests such as human health considerations, wildlife, fisheries, forestry, water and environmental quality. A major consideration in this respect is the Food and Drugs Act, the provisions of which are coordinated with the application of the P.C.P. Act.

The P.C.P. Act was promulgated in 1939, and its provisions require that pesticides that are imported, manufactured or offered for sale in Canada must be registered. Registration is granted only when the Minister is satisfied that the information made available to him is sufficient to demonstrate that the product is effective and safe under practical conditions of use. The Act provides for the evaluation of pesticides that are offered for sale, and for the control of labeling and advertising. It also provides the Minister with authority to refuse registration of a control product that is harmful to humans or domestic animals, or is otherwise unsuitable. The Minister can thereby set forth the purposes for which any product may be represented and to whom it may be sold.

The P.C.P. Act has been revised and its new regulations came into force in 1977. The revised Act broadens the definition of a control product to include a wider variety of products. In addition to importation and sale, it also provides for the regulation of manufacturing premises, storage, distribution, display and use of control products....

Pest Control Products (Sask) Act

Saskatchewan Agriculture

THE PEST CONTROL Products (Sask) Act regulates and controls the use, distribution and handling of pesticides.

Pesticides, though useful and often essential, may be hazardous to users if they are not handled properly. The act helps ensure the safe use of pesticides through the education of pesticide applicators and the regulation of storage, handling and transportation of pesticides.

WHAT DOES THE ACT DO?

Assures that pesticides meet standards for the purpose for which they are registered. Any pesticides used or offered for sale in Saskatchewan must be registered under The Pest Control Products Act (Canada). Each pesticide undergoes many years of testing by research scientists. It must meet specific standards for effectiveness, toxicity, residues, safety, packaging and labelling. After meeting such standards the pesticide may be registered by Agriculture Canada. If the chemical is registered, it may be offered for sale and used for the purposes for which it is registered. These uses will appear on the label.

Ensures that pesticides are used only for the purpose for which they are registered. The use of a pesticide in a manner or for a purpose not stated on the label may be hazardous to the applicator or to plant or animal life or it may leave undesirable residues in the environment.

Requires a permit to be obtained to apply a pesticide to an open body of water. An open body of water means "any body of water above the surface of land which normally flows or overflows to adjacent land or open body of water which is under the control of another owner or owners"....

Ensures the safe disposal of pesticides and containers. The safe disposal of empty containers and quantities of unwanted pesticides is the responsibility of the user. Methods of disposal include recycling, burning and burying

Control of pesticide residues in food

Excerpted from *The Health & Welfare Canada News Bulletin*, Number 51, Fall 1980

THE HEALTH Protection Branch of Health and Welfare Canada, under authority of the Food and Drugs Act, is charged with the responsibility of ensuring that foods offered for sale to Canadians are fit for consumption in that they are safe, clean, and unadulterated. In this capacity, the Branch determines the nature and quantity of pesticide residues that may remain on crops at time of harvest or in animals at time of use for food (i.e., meat, eggs, milk, etc.) and that are considered safe for human consumption. There are provisions in Division 15 of the Food and Drug Regulations to list pesticides and their maximum residue limits for particular food products....

EVALUATION OF SUBMISSIONS

The Health Protection Branch requires manufacturers of pesticides for which maximum residue limits on foods are to be established to submit detailed data on the following:

- specifications and composition of the substance to be used as a pesticide,
- the physical and chemical properties of the substance,
- plant and animal metabolism studies,
- evidence that the product is effective and practical,
- the amount to be applied, frequency and time of application,
- satisfactory method of analysis for determining residues in foods,
- studies designed to determine residue levels on each food,
- toxicity studies,
- a proposed maximum residue limit for each food....

Toxicity studies: The manufacturer is normally required to carry out several types of toxicity studies, for example, acute, subacute, and long-term. The studies take into account such factors as sex, dermal exposure, inhalation exposure, and oral ingestion.

Acute studies are single dose LD50 experiments. An LD50 is the dose that is lethal to 50 per cent of the population of experimental animals.

Subacute studies are short-term feeding experiments; they are designed to find out effect and no-effect levels from a range of low dosages and to further investigate the range of effects caused by the chemical. They also give an indication of the levels to use in the long-term studies, thus avoiding needless expenditure of time and money.

The *long-term or chronic studies* normally involve two species of animals and last approximately two years; various dosage rates are used. In addition, studies, such as those on reproduction and teratogenicity, are usually conducted. Upon completion, various organs

(continued on page 7)

Department of the Environment Act

Saskatchewan Environment

Section 13. Notwithstanding anything in any other Act, the Lieutenant Governor in Council may make regulations: (d) controlling the use and application of chemicals including insecticides and herbicides;

The proposed amendment to this Act is as follows:

Section 13 (d) to be repealed and the following substituted therefor: "(d) prohibiting, restricting or controlling the sale, use, application and disposal of chemicals."

Standards and Regulations

How they work

The question of pesticide control is a complex one, perhaps necessarily so as the potential impact on health, safety of workers, and the environment is so great. The following articles provide information on some of the many federal and provincial agencies involved in the regulation of pesticides.

Some articles debate whether or not these regulations are sufficiently strong. Others elaborate on the recent scandal which uncovered fraudulent testing of chemicals, and raise questions on whether or not the chemical industry should continue to conduct the testing of its own products.

Government role

Pest Control Products Act

Excerpted from *Pesticides: Their Implications for Agriculture*, Agriculture Canada Publication 1315 (1973)

PESTICIDES have long been closely regulated in Canada. Laws have been in force since 1927 to regulate the importation and sale of products used for the control of pests.

The sale of pesticides is regulated by the Pest Control Products Act, which is administered by the federal Minister of Agriculture. Consequently a significant portion of his departmental resources is devoted to research into the control of pests generally, including the use of chemicals and non-chemicals. This work is done in regional laboratories and stations across Canada, where special studies are made on the effects on the environment of the use of pesticides.

In addition to research, two regulatory laboratories analyze samples of products taken in the market place to assure compliance with registration, and to conduct investigations of various kinds for the purposes of the Pest Control Products Act and Regulations.

Pest control chemicals make up a commodity group that covers a wide range of products and uses. The administration of the P.C.P. Act take into account many disciplinary interests such as human health considerations, wildlife, fisheries, forestry, water and environmental quality. A major consideration in this respect is the Food and Drugs Act, the provisions of which are coordinated with the application of the P.C.P. Act.

The P.C.P. Act was promulgated in 1939, and its provisions require that pesticides that are imported, manufactured or offered for sale in Canada must be registered. Registration is granted only when the Minister is satisfied that the information made available to him is sufficient to demonstrate that the product is effective and safe under practical conditions of use. The Act provides for the evaluation of pesticides that are offered for sale, and for the control of labeling and advertising. It also provides the Minister with authority to refuse registration of a control product that is harmful to humans or domestic animals, or is otherwise unsuitable. The Minister can thereby set both the purposes for which any product may be represented and to whom it may be sold.

8 Pest Control Act, 1939

Control of pesticide residues in food

Excerpted from *The Health Protection Branch Bulletin*, Number 1, Fall 1980

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Section 13 Notwithstanding anything in any other Act, the Lieutenant Governor in Council may make regulations controlling the use and application of chemicals including insecticides and herbicides.

The proposed amendment to this Act is as follows.

Section 13 is to be repealed and the following substituted therefor: "only prohibiting, restricting or controlling the sale, use, application and disposal of chemicals."

Pest Control Products (Sask) Act

depending on the nature of the material.

Requires that pesticides be kept in the proper containers. The Provincial and Federal Pest Control Products Acts prohibit the keeping of a pesticide in a container other than the type of container in which the pesticide was originally stored for sale or supply.

Containers and labels are designed for each particular pesticide formulation. Placing a pesticide in any other container is running the risk of mistaken identity, accidental poisoning and leakage.

Requires that the cleaning of apparatus for pesticide application near an open body of water be done in a safe manner. To help guard against contamination of water, the act states that "no person shall cleanse or place in an open body of water any apparatus, equipment or container used in the holding or application of a pesticide". It also specifies that any spraying apparatus used to withdraw water from an open body of water must have a device to prevent a return flow.

Requires that any person who carries on a business of pesticide application have a permit. To ensure the safer use of pesticides the education of applicators through a permitting system is being undertaken. Qualifications which must be met for a permit include taking a course of instruction in the safe use of pesticides.

Ensure safe storage and transportation of pesticides. Requirements have been developed to help ensure safety where storage and transportation of pesticides may lead to possible contamination.

Materials, such as seed grain, treated with pesticides must be bagged, sealed or covered with a tarpaulin during transportation and must be labelled to indicate the treatment. The label must also indicate that the material is not to be used as feed.

Allows a municipality to appoint an inspector to assure that provisions of the act are met.

Saskatchewan Agriculture

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Control . . .

(continued from page 6)

including the liver, the heart, and the kidneys are examined grossly and microscopically by trained pathologists.

Determining the acceptable daily intake. From both the manufacturer's toxicity studies and other data which may be available, the Branch determines the dose per unit of body weight producing no observable adverse effect in animals. The lowest "no effect dose" from any of the toxicity studies is then divided by a safety factor, usually 100, but it can range between 10 and 5000 depending on the pesticide; the figure thus obtained is regarded as an acceptable daily intake (ADI) for humans of that particular pesticide. The ADI is the amount of pesticide that toxicologists consider to be safe for humans to consume each day for an entire lifetime. In general, these levels are in close agreement with the ADI's recommended by the World Health Organization.

Setting maximum residue limits. Maximum residue limits for pesticides on food are established by determining the amounts likely to remain in food at point of sale (e.g., harvest of crops, slaughter of animals) after pesticides are used in accordance with registered uses or good agricultural practice. Such residue limits are only accepted providing that the total consumption of residues from all food uses will not exceed the ADI for the particular pesticide.

The permitted level of pesticide residues varies from no detectable residues to several parts per million, depending on the use patterns and the pesticide concerned. Residues in excess of legal limits are in violation of the Food and Drugs Act and Regulations.

Approximately 250-300 pesticide chemicals are registered in Canada for use in the production or handling of various foods. Health Protection Branch has established residue limits for about 100 of these. The remaining chemicals include those too toxic for any of their residues to be allowed to remain on foods, those not likely to leave any residue because of their chemical nature or the way they are applied, and those exempt from the requirement to set residue limits because of their low toxicity.

ENFORCEMENT

The Health Protection Branch's Field Operations Directorate is responsible for investigating possible violations of accepted residue levels. This program includes monitoring, inspection, education and involves the analysis for pesticide residues of some 2000 samples of imported and domestic foods each year.

When excessive residues are found in food, a thorough investigation is conducted to determine their source and extent. When the information indicates a violation of the Food and Drugs Act and Regulations appropriate action is initiated and many involve removal of foods from the food outlets, seizure of food stocks, rejection of imports, or prosecution.

Food inspectors at Health and Welfare Canada maintain close liaison with local agriculture officials and other agencies and participate in education programs carried out to inform the users of pesticides about permitted residue limits in food and potential hazards associated with misuse of these chemicals.

Industry Role

From test tube to market

(Excerpt from "Pesticides in Canada," by J. C. Macdonald, Agriculture Canada)

THE CANADIAN agricultural chemical industry is regulated by both federal and provincial laws. The Pest Control Products Act embodies the federal regulations. These apply to pesticides developed in Canada and to pesticides developed in other countries and used here.

Before a pesticide can be offered for sale in Canada, the manufacturer must show to the complete satisfaction of the Food and Drug Directorate that, when used according to directions, and in the context of good agricultural practices, the pesticide will not leave any harmful residue on the food to which it has been applied.

The road from test tube to market is long and difficult. Only one out of 4,000 new chemical compounds, on the average, completes the journey. Because each stage in the development of a chemical represents a substantial expenditure, the developing company conducts running tests so that any short-coming or hazard which would prevent the pesticide being registered is revealed as soon as possible.

Here, in summary, is what happens.

After a new compound has been synthesized in the test tube, the first steps is to prove its usefulness. Its effects are tested on different insects, bacteria, fungi, nematodes, rodents and plants. Whether the compound attracts or repels insects is also observed as are its effects on reproduction. The properties recorded at this stage have usually been predicted, but sometimes new properties are found.

In the next stage, the chemicals' performance and reactions are tested under extreme conditions of light, temperature, moisture, etc. It's at this stage that the potential limitations of safety are determined. Using laboratory animals, comprehensive tests of the effects on organs and of different doses are carried out. Tests are conducted with marine specimens to determine the maximum concentration in water that can be tolerated.

The third stage includes production on a pilot plant scale. The pesticide produced under these conditions undergoes extensive field tests in different regions in order to have the safety test data required by the time registration is sought, long term feeding studies on a variety of laboratory animals are begun at this stage. The effects of the chemicals through two or three generations are studies over a two year period.

At this stage, some of the more complex tests on the safety of residues are carried out. A major problem in this respect is to identify the residue for it often undergoes complex changes when exposed to the elements or when it has been consumed by a test animal. Radioactive tracers are used to follow the pesticide through its history. If the residue has a different structure than the original chemical it too has to be located for its effects. Moreover, the manufacturer has to develop

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User Role

Safe handling of chemicals

(Excerpt from "Pesticides in Canada," by J. C. Macdonald, Agriculture Canada)

GREAT CARE must be exercised when handling pesticides and herbicides because these chemicals can enter the body through the nose, mouth, skin or eyes.

Once in the body, the chemical can cause acute poisoning which occurs within 24 hours or chronic poisoning which happens subtly over a lifetime.

When farmers consider an investment in protective equipment, they must consider purchase cost relative to the health risks connected with not using proper protective equipment.

Following is a summary of what is available and recommended for use:

Gloves — use rubber or neoprene gloves only. A variety of thicknesses are available depending on the need for sense of touch, wet grip, cut resistance and abrasion resistance.

Goggles — use goggles when mixing or handling chemicals and whenever there is a risk of contact with spray mist. A variety of goggles exist but the most preferable is a completely enclosed type with covered vents.

Respirator — use only respirators which have been tested and found satisfactory for the type of chemical in use.

Aprons — use a plastic apron when mixing or handling agricultural chemicals.

Hats — wear a non-cloth hat when there is a risk of exposure to driplets of chemicals especially when marking for aircraft spraying.

Boots — wear rubber boots when mixing or handling chemicals except when only a small amount is involved. Leather boots will absorb and concentrate agricultural chemicals and in this way, will present a constant risk to the feet.

Other Equipment — use common sense. If heavily exposed to chemicals, ensure more complete body coverage. The choice is yours as to how much or how little exposure you have to agricultural chemicals.

For further research and study

Consider: "Millions of pounds of pesticides are now spread on agricultural land and on crops throughout Canada each year." In Saskatchewan alone, pesticide sales are approaching ten million pounds a year. Outline the role and responsibilities of each of the following in the control of chemical pesticides: government departments — both federal and provincial, manufacturer, and user. Can you see any problems arising from the involvement of so many agencies in the regulation of pesticides? What might be some benefits? Why do you think so many agencies are involved?

Compare Saskatchewan's regulations with other provinces. Which regulations are specific to the province, and the nation? Do certain localities within the province have specific regulations? Give examples.

Consider: "The road from test tube to market is long and difficult. Only one out of 4,000 new chemical compounds, on the average complete the journey." Describe the testing procedures that a new chemical is subjected to before it appears on the market. Should the chemical industry be solely responsible for testing? Why or why not? It is estimated that scientific testing for each new product can amount to millions of dollars. Do you think the Canadian taxpayer would be willing to absorb some of these costs? Are there any alternatives?

Suggestion: Research the terms lethal dosage and toxicity.

Question: Why do you think the government of Saskatchewan is proposing a change to the Department of the Environment Act? Do you think the standards and regulations pertaining to chemical pesticides are adequate?

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Excerpted from Indian Head Weekly News, September 17, 1980

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Consider: "The road from test tube to market is long and difficult. Only one out of 4,000 new chemical compounds, on the average complete the journey." Describe the testing procedures that a new chemical is subjected to before it appears on the market. Should the chemical industry be solely responsible for testing? Why or why not? It is estimated that scientific testing for each new product can amount to millions of dollars. Do you think the Canadian taxpayer would be willing to absorb some of these costs? Are there any alternatives? **Suggestion:** Research the terms lethal dosage and toxicity. **Question:** Why do you think the government of Saskatchewan is proposing a change to the Department of the Environment Act? Do you think the standards and regulations pertaining to chemical pesticides are adequate?

Standards and Regulations

What are the problems?

Safety last: tests that fail the test

Excerpted from *Maclean's*, August 25, 1980

By Peter von Stackelberg

PESTICIDES are approved for sale in Canada on a sort of honor system. The chemical company that develops a product is responsible for paying an independent lab to test for short and long-term health hazards. The results are then submitted to the federal government for registration in Canada. Short of going to the considerable expense of duplicating all testing, the government has little choice but to trust that the procedures have been appropriate and the results honest. And this is where the honor system has broken down. In the past decade alone, separate cases of fraud involving more than a dozen labs or chemical companies have been uncovered in the United States. The most serious recent case involves more than 100 pesticides tested by the American testing facility, Industrial Biotech Laboratories (IBT). Washington's Environmental Protection Agency (EPA) is investigating suspected fraud and incompetence in the procedures employed by the company to test possible long-term health hazards. As well, EPA spokesman Jim Sibbison says the

agency is auditing test results from "nine or 10 laboratories because of the possibility of careless or deliberately careless work."

Although problems with IBT's testing were first discovered in 1977, Canadian officials didn't release the list of suspect chemicals until mid-June — after three months of repeated inquiries from Saskatchewan's environment department, news media and MPs.

The problem has prompted new demands that the federal government establish its own testing facilities. Regina East MP Simon de Jong, the NDP's science critic, says private laboratories have proven they are simply not morally capable of doing the job. He is critical of a recent statement by federal Health Minister Monique Bégin that Canada is a small country that would have trouble testing all the chemicals in use here and should therefore take advantage of whatever information it can get elsewhere. Says de Jong: "The information we have been obtaining from other countries has proven to be false. The argument in favor of our own independent, trustworthy labs is just plain common sense."



Reprinted from *The Regina Leader-Post*, September 23, 1980

The following is an updated list of the IBT chemicals of concern to Saskatchewan:

Barban	Vapona
Calcium hypochlorite	Vitavax
Captan	
Captafol	
Carbofuran	
Chlorpyrifos	
Chlorothalonil	
Ciodrin	
Diazinon	
Endosulfan	
Fensulfothion	
Folpet	
Glyphosate	
Methamidophos	
Metribus/Metribuzin	
Picloram	
Polyram	
Propoxur	
Pyrethrins	
Sodium chlorate	
Terbufos	
Thiofanox	
Triallate	

Provincial officials want easier access to chemical-safety information

Excerpted from *The Regina Leader-Post*, November 28, 1980

by Peter von Stackelberg

EASIER ACCESS to information on the health effects of chemical pesticides was demanded at a meeting on chemical safety held Thursday.

A number of provincial government officials said the federal government has been denying access to documents requested by provincial authorities.

Dr. Don Waite of the provincial environment department said he has been unable to get information he needs that would protect the health of people in this province. He said up-to-date information is frequently needed to make decisions on the use of a wide variety of chemicals.

Dr. David Penman, another official with the environment department, said the credibility of the federal government has been seriously strained. Penman noted that since March, 1980, the province has repeatedly asked for information about the chemicals involved in the Industrial Biotech Laboratories (IBT) affair.

But in spite of repeated federal statements that the information would be released the province has not yet received the kind of information it is looking for, he said.

The inadequacy of labeling on chemical containers was also a topic of hot discussion during the meeting.

Bill Gilbert, a former member of the grain workers and elevator employees union, said labels on

pesticide containers were "no where near adequate in protecting people."

Gilbert was critical of instructions on the can that do not give enough information for a person to properly protect himself.

"It says use a respirator, for example. But what kind of respirator? Many kinds are no good for protection against pesticide vapors."

He said full information about the potential health effects of exposure to the chemicals should also be printed on the labels. As well, Gilbert suggested that there be tougher enforcement of regulations governing the safe handling, transportation and storage of pesticides. Government should shut down chemical dealers who violate the regulations, he said.

It was also suggested that chemical pesticide dealers have a comprehensive set of manuals about the hazards, uses and methods of application of all the chemicals they sell.

Another recommendation put forward at the meeting was that the federal and provincial governments train and hire more scientists with the skills to determine the potential health effects of chemicals used in this country.

Dr. Claire Franklin, head of the pest control products section of the federal department in Ottawa, said there was an almost complete lack of Canadian laboratories capable of testing the health effects of chemicals.

"We would be more than pleased if more toxicology testing were done in Canada," she said.

Banned herbicide still a big seller

Excerpted from *The Globe and Mail*, February 28, 1981

by Edward Greenspon

A RECENT federal Government ban on manufacturing some forms of the chemical 2,4-D has not convinced Saskatchewan farmers to abandon the popular herbicide. In fact, service centres throughout the province have been swamped by farmers wanting to buy available stocks, despite findings of a highly toxic family of chemicals, known as dioxins, in samples of the agricultural chemical.

"There are a few farmers concerned about possible health hazards who are deciding not to use the product. But for every one of those there are many trying to buy more," said Rick Holm, a pesticide officer with the provincial Government.

The response is consistent with the stand farmers have taken since dioxin contamination was first discovered last fall. Farm groups in Western Canada rallied to defend 2,4-D during its trial by federal Government scientists and policy makers.

The farm groups said any dangers from 2,4-D use must be

proved beyond a shadow of a doubt before imposing a ban.

But the argument that most influenced Ottawa was economic. A private report from the Saskatchewan agriculture department said 2,4-D use in the province is responsible for the production of 30 million additional bushels of wheat a year. The loss of this production would cost farmers more than \$150 million, the department said.

The federal Government reacted by assuring the chemical would be in good supply this year, while at the same time banning the manufacture of certain forms. "I realize these measures will not please everybody," Minister of Agriculture Eugene Whelan said in announcing the ban. "It's simply not possible to phase into completely dioxin-free 2,4-D this year."

The stay of execution granted the chemical allows for the continued sale of any 2,4-D products already in the system. The further manufacturing of ester-based 2,4-D will not be allowed to resume until the industry can develop a dioxin-free manufacturing process.

**IMPORTANT NOTE CONCERNING THE FOLLOWING
PAGES**

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Federal government cannot release information

Excerpted from *The Regina Leader-Post*, March 4, 1981
by *Peter von Stackelberg*

REGULATIONS covering trade secrets will prevent the federal government from revealing any information about faulty and fraudulent tests on many pesticides used in Canada.

Saskatchewan environment minister Ted Bowerman said in a news release Tuesday that his department will not be able to get information about problems with studies done by Industrial Biotech Laboratories in the U.S.

Bowerman said the federal health department refuses to release the information. Several hundred studies IBT did into the safety of more than 200 chemicals are invalid because of faulty or fraudulent work.

A recent letter written by federal health minister Monique Bégin to health, environment and agriculture ministers in all 10 Canadian provinces said information about the IBT tests could not be released because of regulations protecting trade secrets.

Bégin cited a ruling by the federal justice department as the reason she could not release information the Saskatchewan government has been requesting since June, 1980.

Dr. W.P. McKinley, head of the team dealing with the IBT affair

for the federal health department, confirmed that protection of trade secrets prevented the release of the information.

McKinley added that the justice department warned that the federal government could leave itself open to legal action from chemical manufacturers whose reputations might be damaged by the release of memos outlining flaws in the IBT tests.

"The refusal of the federal government to release the information may have an impact on the Saskatchewan government's ability to safeguard the environment and public health and safety," Bowerman said.

He said the Saskatchewan government is working on "alternative methods of obtaining the information." But he did not elaborate on what was planned.

Hugo Maliepaard, head of the policy planning and research branch of the Saskatchewan environment department, said the provincial government will be seeking its own opinion on whether information about IBT could be considered a trade secret.

Maliepaard said the federal action leaves his department in a difficult spot.

"The main thing that concerns us is that certain chemicals need permits when they are to be applied to water. We want more information than we have before

CACA official wants secrets kept secret

Excerpted from *The Regina Leader-Post*, March 10, 1981
by *Peter von Stackelberg*

PUBLIC ACCESS to tests on the health effects of pesticides should be restricted, a spokesman for the Canadian Agricultural Chemicals Association (CACA) said.

"It is important that it (health data) remain confidential because it belongs to someone," A.D. St. Clair, president of the CACA said in a telephone interview this week.

"The data we work on and provide to government is a valuable piece of intellectual property."

"Under the capitalist system you simply don't give away valuable property," he said.

He said the public certainly does have a right to know many things, but he said health data developed by companies is not one of them.

"The public simply can't understand the information itself. There is simply no use in publishing the data. If you publish it, you end up getting some amateur scientist or science writer interpreting it," St. Clair said.

That could lead to distortions, misinterpretation and a lot of confusion on the part of the public, he said.

St. Clair also noted that making public the results of scientific tests into the safety of a chemical would be unfair to the company that paid for those tests. He said other companies could start manufacturing the chemical and support their registration of the chemical with the original safety tests.

He said it would be very unfair if a competitor was able to use data for which it had not paid anything.

"We as an industry would and do let health data go to government authorities on a confidential need-to-know basis."

He noted that at present information about possible problems

we issue permits for chemicals on the IBT list."

"If there are safe alternate chemicals to those on the IBT list, we will issue a permit for those chemicals instead. If there is no alternative, we will outline clearly our concerns on the IBT situation to the chemical user."

McKinley said Canadian officials have concentrated on long-term studies they consider to be critical in ensuring the safety of pesticides now in use. He said of 880 studies reviewed so far by officials with the federal health department and by the U.S. Environmental Protection Agency, 470 have been found to be invalid for some reason.

All of IBT's chronic rodent studies, which McKinley said were extremely important in determining possible health hazards, reviewed so far were judged to be invalid. As well, McKinley said significant numbers of other tests were invalid, including those for: Cancer — 94 per cent invalid; Reproductive disorders of various types — 79 per cent; Birth defects — 75 per cent; Effects of fish and wildlife — 75 per cent;



SASKATCHEWAN PHOTO ARTS DIVISION

Test results are based on good faith.

Better labelling requested

Excerpted from "Snyder asks better labelling", *The Regina Leader-Post*, January 27, 1981

BETTER LABELS on industrial and agricultural chemical containers are needed to protect the health of workers, Labor Minister Gordon Snyder says.

Improved labelling is needed to ensure that workers know the health hazards presented by the chemicals to which they are exposed, Snyder said in a news release.

The system now used for labelling pesticide products is deficient in that long-term and chronic health effects of pesticides are ignored, Snyder said. He said that even if a pesticide is strongly suspected of causing cancer, or has been shown to cause birth defects or similar type of problem in test animals, no warning is given.

"Warnings should be given about long-term and chronic health hazards of pesticides — both known and suspected." He said similar types of warnings should be printed on labels for industrial chemicals.

Snyder has requested action from the federal ministers of labor and agriculture regarding the labelling problems and is waiting for their replies.

Sub-acute doses of chemicals to determine medium range effects — 68 per cent; Toxic effects on the nervous system — 64 per cent; Long-term effects on dogs — 53 per cent; Mutations to organisms in vitro (in a test tube) — 44 per cent; and, Chemical residues in food crops — 42 per cent. . .

Concern over farm chemicals

Excerpted from *The Meadow Lake Progress*, April 8, 1981.

THE ENVIRONMENTAL series lecture held last Tuesday evening focused on agricultural chemicals. Alan Cessna from the Agriculture Canada Research Station in Regina explained that although present technology allows researchers like himself to identify minute amounts of chemical residues in crops, toxicologists cannot determine the extent of the ill-effects of these residues have on humans. He told the concerned people present that all testing of farm chemicals is done by the manufacturer or their agents—none is performed by government agencies. Therefore test results are based on good faith with the chemical companies with no verification of their claims. . .

The second speaker, Elmer Laird, is a non-chemical farmer from Davidson. He expressed his concerns over chemical use in the environment, noting that Saskatchewan farmers apply eight pounds of chemicals for every personal examples of chemical ill-effects and went on to explain that he markets his grain through a health food distributor at a premium to Wheat Board prices.

He expressed dismay with the false testing of chemicals used in Saskatchewan by an American laboratory. He called for a ban on all chemicals in the province not yet retested and equal government support of non-chemical agriculture as is given to chemical farming.

He went onto outline some cultural practices he employs to control pests. Many concerns were raised by the farmers in the audience over their long term exposure to chemicals. The consensus of the speakers was that there is no guarantee that using chemicals is risk-free and that more research into their effects on health is required. They urged people to apply political pressure to ensure continued research.

For further research and study

CONSIDER: "No other products on the market, apart from drugs undergo such extensive testing before being sold." (A.D. St. Clair, Vice President of Diamond Shamrock Canada Ltd.) Why might a product prove to be more toxic than originally proved? Should testing continue after the product is on the market?

CONSIDER: Even though a chemical is banned, this does not mean that it is no longer used. Find out what chemicals have been banned in Saskatchewan. Are some of these chemicals still in use in the province? How is this possible?

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The system now used for labelling pesticide products is deficient in that long-term and chronic health effects of pesticides are ignored, Snyder said, he said that even if a pesticide is strongly suspected of causing cancer, or has been shown to cause birth defects or similar type of problem in test animals, no warning is given.

"Warnings should be given about long-term and chronic health hazards of pesticides — both known and suspected," He said similar types of warnings should be printed on labels for industrial chemicals.

Snyder has requested action from the federal ministers of labor and agriculture regarding the labelling problems and is waiting for their replies.

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Range of Views

The controversy over pesticide use draws views from many sides.

Governments, industry, urban groups, environmentalists, and individuals have become involved in discussions on the issue.

What must be weighed in coming to a decision on the issue are the benefits versus the risks associated with the use of pesticides.

Dangerous but . . . chemicals necessary to feed the world

Excerpted from the *Maclean's* Review, October 8, 1981

If the agriculture industry is to feed a hungry world the use of chemicals is necessary and the risks involved are balanced, A.D. St. Clair, vice president of Diamond Shamrock Canada Ltd., told 400 people attending the annual Farmer Appreciation Night.

Mr. St. Clair said chemical companies have been subjected to controversy and criticism but he asked, "What will happen to Canadian Agriculture if the partners in food production fail to support the use of pesticides in the production of food? After one year of having no pesticides available the volume of crop grown would drop by 30 per cent and the quality would be lower than consumers are used to, especially in fruit and vegetables."

The price of foodstuffs would increase by 200 to 300 per cent in one year if production dropped, and countries that rely on imports from Canadian production would find themselves without, he said.

No other products on the market, apart from drugs, undergo such extensive testing before being sold, Mr. St. Clair said. Each new product undergoes from 60 to 70 tests and may cost a minimum of \$5 million with \$10 million not being unusual to bring a product to market.

He said there is extensive testing on residue left on products from spraying and said emphatically "foodstuffs are not laden with pesticides." Standards of residue are established by the United Nations.

Products must pass the scrutiny of Health and Welfare, wildlife, fish and oceans groups, and environmental groups for toxicity.

"The products we sell are toxic and can be dangerous if used improperly. They must be used in

exact accordance with label directions. There are no horror stories when used properly, following the directions for mixing, spraying and dosage rates. It is essential that farmers not become too familiar or too careless with the products because they are all potentially as dangerous as drugs or poison," Mr. St. Clair said.

Mr. St. Clair noted that pesticides, by their nature, are a controversial issue for a number of reasons. People feel they represent modern technology; that they are large corporations; the volume of public opinion says small is best; that organic farming is better than technology; natural is better than synthetic; that products are all toxic to some degree and potentially dangerous to health and ecology; that there is a hazard of inserting chemicals into the environment to achieve a short-range objective, that profit is the objective; that farmers do not use them safely.

Mr. St. Clair said they are criticized for rushing ahead, for not being more knowledgeable on the long-term effects of chemicals he said "the opponents, the pests, will not wait, insects and fungus diseases will not wait."

"We have to weigh the benefits of food production against the risks," he said.

The media call their products cancer producing but he said most products including sugar and salt, if used excessively, could cause cancer.

"As long as we don't speak out and defend ourselves to the farmers, industry and consumers our products will be knocked down like dominoes. In the chemical industry we realize we are partners with the farmers, retail grocers, and everyone involved. We want to reassure the public that has lost faith in us."

Pesticides prove to be no panacea

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THE MASSIVE chemical assault on the pests that plague North American food production is not the cure-all once anticipated.

At one time chemical pesticides were thought to be the solution to dealing with those pests.

Man has used a variety of pest control measures for centuries to protect his crops, but the most significant move came in the late 1940s.

But the expected victory over pests, and particularly insect pests, has not come.

About one-third of North American food production is now being lost before it is harvested despite the massive use of chemicals, the Office of Technology Assessment for the U.S. Congress said in a report published last year. It said another 10 per cent is lost after harvest. The losses in tropical climates are even higher, the report said.

"The amount of land now cultivated is 50 per cent greater than would be required if there were no pest-induced losses," he said.

Crop losses to insects, disease, and weeds increased 1.5 per cent between 1950 and 1975, U.S. Department of Agriculture statistics show.

Figures cited in a 1978 report by Dr. David Pimental, a professor with the faculty of agriculture and life sciences at Cornell University, show a few successes.

Losses to weeds in the last 35 years dropped by 5.8 per cent.

"This is undoubtedly due to improved herbicidal, mechanical and cultural weed control practices," Pimental said in his report.

"Over that same period, losses from plant pathogens increased only slightly, from 10.5 per cent to 12 per cent."

"Crop losses on the average due to insect pests, however, have increased nearly two-fold."

U.S. Department of Agriculture

figures show that crop losses due to insects went from seven per cent in the 1940s to 13 per cent in 1978, despite a 10-fold increase in the use of insecticides.

"The substantial increase in crop losses due to insect damage despite increased pesticide use can be accounted for by some of the major changes that have taken place in agriculture since the 1940s," Pimental said.

Among them are:

- Planting of some crop varieties that are highly susceptible to insect pests;
- Destruction of natural enemies of certain insect and plant pests;
- Reduced crop rotations and crop diversity, which allows a build-up of certain pests;
- Reduced sanitation in fields, including less attention to getting rid of plant residues and infected crop residues;
- Planting of crops in marginal areas where they are more susceptible to attacks from pests; and
- Use of pesticides that changes the biology of the plant slightly, making it more susceptible to pests.

One of the biggest problems has been the evolution of insects that are resistant to the toxic effects of the man-made poisons.

American authorities estimate there are now about 400 species of insects resistant to pesticides. That is more than twice the number of resistant species just 15 years ago.

That immunity can spell disaster for farmers who depend solely on the chemicals that the pest is immune to. If the chemical no longer works and natural enemies of the pest have been eradicated by the chemicals, this leaves the pest species free to multiply dramatically.

The Office of Technology Assessment said in its report that this resistance to insecticides, plus other factors that restrict or stop the use of alternative chemicals, could have serious consequences.

Consumer group issues pesticide use warning

Excerpted from *The Saskatchewan Star-Phoenix*, June 11, 1981

MONTREAL (CP) — Farmers are going buggy trying to keep produce insect free, but it's the buyer who has the most to lose, says a consumers group.

Pesticide-laced fresh fruit and vegetables represent an invisible threat to health, despite government assurances that the quantity of chemicals used to grow our apples and tomatoes is harmless, says the Co-Op des Consommateurs de Montreal.

"Are the benefits of pesticide usage worth the risks?" asked Poulin.

She said pesticides destroy the delicate ecological soil balance, disrupt nutrients in the food and

cause 500,000 deaths or injuries throughout the world each year, according to World Health Organization (WHO) estimates.

About 25 per cent of the 5,000 to 6,000 pesticides in use around the globe, containing 500 to 600 active ingredients, are carcinogens and nothing is known about their effects in combination with each other.

"Unfortunately, there's nothing the consumer can really do," said Poulin, "except wash their produce carefully and shop at corner stores or health food stores where they know the fruits and vegetables are grown without insecticides."

The cooperative also recommends doing away with pesticides around the house and garden.



Farmer sprays for wild oats at the same time as seeding wheat.

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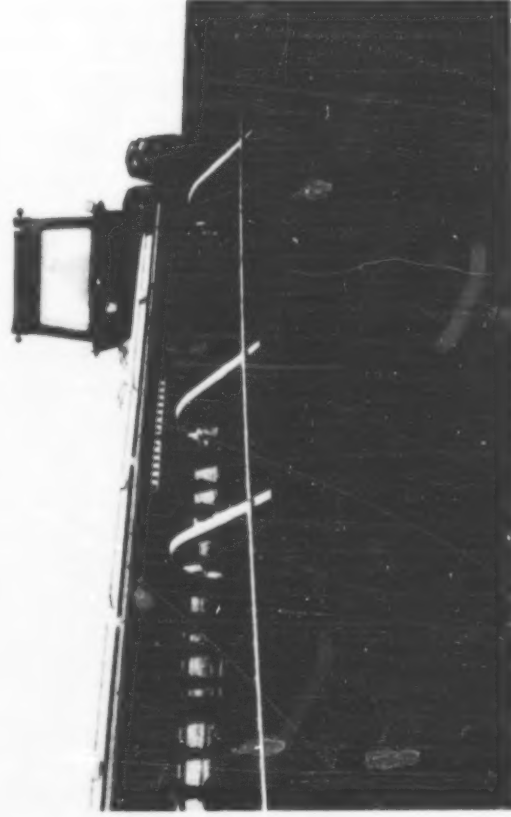
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SASKATCHEWAN PHOTO ARTS DIVISION

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The co-operative also recommends doing away with pesticides around the house and garden. . . .

Chemicals "unfairly maligned"

Excerpted from *The Regina Leader-Post*,
September 17, 1980

by *Edward Greenspon*

AGRICULTURAL CHEMICALS are being unfairly maligned by merchants of panic among the environmental extremists, a sensation-seeking media," a Canadian Agricultural Chemicals Association representative told a farm safety meeting Tuesday.

Agricultural chemicals are integral to food production, Don Saelhof told a seminar of the Canada Safety Council. And despite poor publicity they have never been linked to a human death when used properly," he added.

The chemical industry has an interest in ensuring its products are safe, he said, both because of substantial development costs and human concern.

"We are not fast-talking hucksters or mad scientists out to doom the world. We prefer to talk facts, numbers and hard data versus broad concepts, anxiety and innuendo as we have seen in much of the so-called environmentalist literature of late," the association's Saskatchewan government liaison chairman said.

Saelhof said he favors the regulation of agricultural chemicals by governments because it keeps the industry honest and ensures intensive scrutiny of new products. Chemical pesticides are poisons and must be carefully applied, he said.

A chemical company might spend \$20 million over 10 years developing a new compound. With an investment of this magnitude the company will be sure to market products that pass government registration standards, he said. A chemical can fail to be registered or, if it is approved, can still be removed from the market at any time.

Recent removals of chemicals are

SARM defends 2,4-D

Excerpted from *The Western Producer*, November 13, 1980

by *Larry Kusch*

THE BANNING of 2,4-D would bring about a situation "bordering on chaos," the government of Saskatchewan has been warned.

In a brief to the provincial cabinet recently, the Saskatchewan Association of Rural Municipalities said that without the chemical, farmers would have severe weed problems, and the province's economy would suffer as a result.

"It is estimated that if the phenoxy herbicides, of which 2,4-D is the main one, were taken off the market, food production would drop by 25 to 30 percent in the first year and by 50 percent within five years."

"The dollar value of wheat loss in Saskatchewan at present prices would be in the order of \$300 million annually. Coupled with this, there would be increased cultivation costs, higher dockage and lower quality grain."

SARM said that the removal of 2,4-D would also hurt exports.

"Without 2,4-D we wouldn't need to worry about an embargo on grain going to Russia because we couldn't be able to fill our present commitments, and we could use our provincially-owned hopper cars to haul potash because we wouldn't have enough grain to utilize them..."

almost a vindication of the industry because they demonstrate the sophistication of safety research, he said. he credited "alarmist critics" with supplying the pressure that has made agricultural chemicals "the most thoroughly researched, tested, proven and controlled operation in a modern, technologically advanced economy."

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Much of the public apprehension surrounding chemicals derives from a lack of comprehension about the risks and benefits, Saelhof said. He blamed the banning of some chemicals on politics and misunderstandings.

For instance, he defended DDT

and 2,4,5-T, both banned by the government, saying the actions were the result of political pressure. The scientific data against DDT has been refuted and none ever existed condemning 2,4,5-T, he said.

"Governments today are under severe pressure from environmental groups and that gravitates towards a bias," he said.

The chemical industry's clout with government is no match for environmentalists he said.

Still, he welcomed the government presence as a means of weeding out "bad apples" like Industrial Biotech Laboratories — an American firm accused of faking scientific data about agricultural chemicals to make their registration easier.

"The industry is discouraged and frustrated with that situation," he said.

Kaeding concerned about hysteria over farm chemicals

Excerpted from *The Western Producer*, November 26, 1980

by *Jonas Weinrauch*

RURAL AFFAIRS MINISTER Edgar Kaeding said he is seriously concerned about the hysteria developing which would deny Saskatchewan producers the use of many chemicals which are so necessary to profitable grain and livestock production....

He said that recently medical authorities have expressed strong doubts as to the adequacy of the tests which have been conducted by chemical companies to ensure that these products are safe.

"I am convinced that there are none among us who would wish to

continue to use these chemicals if they were proven to be hazardous to the lives of the farmers who use them, or indirectly to the consumers of the end product.

"The same people who often so vigorously oppose any chemical use the same ones who will use tobacco, drugs and alcohol — whose known health risks have been well documented.

"I believe it is necessary that all of these chemicals be adequately tested," said Kaeding.

He said certain hard choices may have to be made. "World food agencies are continually warning us that unless we produce an increasing amount of food yearly, many millions of people will go hungry and indeed may starve."

Kaeding said this summer, when many farmers failed to spray their crops because of uncertainty due to the drought, provided strong evidence of the magnitude of crop losses which would occur if the use of many of the herbicides were to be curtailed.

"Probably we would not need to worry about buying more hopper cars for the future, and I suggest that the possibility of a 50 per cent increase in production of grain products would never be achieved."

"All of us are concerned that the pressure being applied against the use of these chemicals be balanced with a rational concern over the need for greater production....

No safe level

Excerpted from *The Regina Leader-Post*, October 17, 1980

I READ with interest "chemicals unfairly maligned" in the Sept. 17 issue. The article attributes many quotes to Don Saelhof of the Canadian Agricultural Chemical Association.

Agricultural chemicals have been linked to human death but that is only a part of the issue. Some agricultural chemicals are known to be carcinogenic or carcinogenic promoters and many are suspected. Most scientists agree that there is no level at which a cancer causing agent doesn't cause cancer. There is no safe level.

Of even greater concern than this is the fact that most agricultural chemicals have not been adequately tested for human health and safety in Canada or the U.S.A. because it was not a requirement when chemicals were registered. Government registration has concentrated on labelling requirements....

Mr. Saelhof's statements about 2,4,5-T are also questionable. Both 2,4-D and 2,4,5-T have been suspected of being carcinogenic since 1969. This fact alone should be cause for grave concern in Saskatchewan where one twelfth of the world's total production of 2,4-D is sprayed into the air and no adequate health study has yet been carried out on those most at risk; farmers, farm workers and the fetus of pregnant farm wives.

2,4,5-T has been a known teratogenic agent since 1969, at least, because it contains TCDD (Dioxin) and 2,4,5-T cannot be without dioxin. Also studies conducted in Saskatchewan have shown that many rivers and lakes contain 2,4-D, 2,4,5-T, Lindane and Alpha BHC. Our chemical chickens are coming home.

Finally the IBT affair is just the tip of the iceberg. A report from the U.S. government Accounting Office points out that EPA has not yet determined how it will perform safety reassessment tests on 6,000 pesticide tolerances. It goes on to state, "the EPA has a long way to go before it can assure the public that approved (pesticide) tolerance levels are reasonably safe."

Many agricultural chemicals should be banned. However, agriculture has become dependant on chemicals (just like drug addicts) and a slow withdrawal is probably the only way to prevent severe production losses.

Nevertheless the goal of all farmers and the federal and provincial departments of agriculture (who have promoted much of the chemical use) should be to phase out the use of agricultural chemicals as fast as possible. The health and environmental risks are too great to consider any other course of action.

For further research and study

Suggestion: Review the various positions on the use of chemical pesticides. Prepare a chart which outlines the risks and benefits of chemical use. Who are the key players in this issue? In a role-playing exercise debate the issue.

Consider: Are you personally willing to risk the hazards related to pesticide use? Are there alternative means to chemical control of pests that you would be prepared to use?

Chemicals "unfairly maligned"

Excerpted from *The Best in Canada '88*,
September 17, 1988, by
Eduard Greenspan

AGRICULTURAL CHEMICALS are being unfairly maligned by merchants of panic among the environmental extremists and sensation-seeking media," a Canadian Agricultural Chemicals Association representative told a farm safety meeting Tuesday.

Agricultural chemicals are integral to food production. Don Saelhof told a seminar of the Canada Safety Council. And despite poor publicity they have never been linked to a human death when used properly," he added.

The chemical industry has an interest in ensuring its products are safe, he said, both because of substantial development costs and human concern.

"We are not fast-talking hucksters or mad scientists out to doom the world. We prefer to talk facts, numbers and hard data versus broad concepts, anxiety and innuendo as we have seen in much of the so-called environmentalist literature of late," the association's Saskatchewan government liaison chairman said.

Saelhof said he favors the regulation of agricultural chemicals by governments because it keeps the industry honest and ensures intensive scrutiny of new products. Chemical pesticides are poisons and must be carefully applied, he said.

A chemical company might spend \$20 million over 10 years developing a new compound. With an investment of this magnitude the company will be sure to market products that pass government registration standards, he said. A chemical can fail to be registered or, if it is approved, can still be removed from the market at any time.

Recent removals of chemicals are

SARM defends 2,4-D

Excerpted from *The Best in Canada '88*,
September 17, 1988, by
Larry Kusch

THE BANNING of 2,4-D would bring about a situation "bordering on chaos," the government of Saskatchewan has been warned.

In a brief to the provincial cabinet recently, the Saskatchewan Association of Rural Municipalities said that without the chemical, farmers would have severe weed problems, and the province's economy would suffer as a result.

"It is estimated that if the phenoxy herbicides, of which 2,4-D is the main one, were taken off the market, food production would drop by 25 to 30 percent in the first year and by 50 percent within five years."

"The dollar value of wheat loss in Saskatchewan at present prices would be in the order of \$300 million annually. Coupled with this, there would be increased cultivation costs, higher dockage and lower quality grain."

SARM said that the removal of 2,4-D would also hurt exports. "Without 2,4-D we wouldn't need to worry about an embargo on grain going to Russia because we couldn't be able to fill our present commitments, and we could use our provincially-owned hopper cars to haul potash because we wouldn't have enough grain to utilize them."

almost a vindication of the industry because they demonstrate the sophistication of safety research, he said, he credited "alarmist critics" with supplying the pressure that has made agricultural chemicals "the most thoroughly researched, tested, proven and controlled operation in a modern, technologically advanced economy."

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Still, he welcomed the government presence as a means of weeding out "bad apples" like Industrial Biotech Laboratories — an American firm accused of faking scientific data about agricultural chemicals to make their registration easier.

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Kaeding concerned about hysteria over farm chemicals

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November 10, 1988, by
Jonas Weinrauch

RURAL AFFAIRS MINISTER Edgar Kaeding said he is seriously concerned about the hysteria developing which would deny Saskatchewan producers the use of many chemicals which are so necessary to profitable grain and livestock production. . . .

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"I am convinced that there are none among us who would wish to

continue to use these chemicals if they were proven to be hazardous to the lives of the farmers who use them, or indirectly to the consumers of the end product.

"The same people who often so vigorously oppose any chemical are the same ones who will use tobacco, drugs and alcohol — whose known health risks have been well documented.

"I believe it is necessary that all of these chemicals be adequately tested," said Kaeding.

He said certain hard choices may have to be made. "World food agencies are continually warning us that unless we produce an increasing amount of food yearly, many millions of people will go hungry and indeed may starve."

Kaeding said this summer, when many farmers failed to spray their crops because of uncertainty due to the drought, provided strong evidence of the magnitude of crop losses which would occur if the use of many of the herbicides were to be curtailed.

"Probably we would not need to worry about buying more hopper cars for the future, and I suggest that the possibility of a 50 per cent increase in production of grain products would never be achieved."

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Of even greater concern than this is the fact that most agricultural chemicals have not been adequately tested for human health and safety in Canada or the U.S.A. because it was not a requirement when chemicals were registered. Government registration has concentrated on labelling requirements. . . .

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Many agricultural chemicals should be banned. However, agriculture has become dependant on chemicals (just like drug addicts) and a slow withdrawal is probably the only way to prevent severe production losses.

Nevertheless the goal of all farmers and the federal and provincial departments of agriculture who have promoted much of the chemical use should be to phase out the use of agricultural chemicals as fast as possible. The health and environmental risks are too great to consider any other course of action.

For further research and study

Suggestion: Review the various positions on the use of chemical pesticides. Prepare a chart which outlines the risks and benefits of chemical use. Who are the key players in this issue? In a role-playing exercise debate the issue. Farmers, chemical manufacturers and their employees, and environmentalists should all be represented. Outline the perspectives on pesticide use for each of these groups. Is there any agreement among the groups? Where do

Consider: Are you personally willing to risk the hazards related to pesticide use? Are there alternative means to chemical control of pests that you would be prepared to use?

The Alternatives

Regina group works on biological controls

by Peter von Stackelberg

BIOLOGICAL CONTROL of pests is being touted as the alternative to chemical pesticides.

It is seen by many as the non-polluting, non-poisonous answer to the problems that face a world needing more and more food. But there are problems to overcome and much more research is needed before a major dent can be made in the use of chemical pesticides.

Most of the research work being done in Canada into biological control of weeds is done at the federal agriculture research station in Regina.

"A lot of weeds we have here came from Europe or Asia. They got here without their natural predators. We are interested in re-establishing the predators that got left behind," (Dr. Jim Hay, director of the station.) said.

"But we can only bring in the ones that are absolutely specific to the weeds. The whole crux of this is that the insects must feed only on one specific weed."

He said that narrows the range of potential insect candidates down to a very few and the weeds that would be suitable for insect control methods are limited. The Regina station is looking at only about a half dozen weeds that could be controlled in this manner.

"We are not going to be able to find insects to control all weeds. Anything we bring in to control, say wild oats, well the chances are it will eat oats as well and there's no way we want that."

"But that does not mean that insects will not pay off. If we can find one for, say leafy spurge or Canada thistle, this would be a tremendous boon to farmers," Hay said.

"We don't have all that many weeds. Right now there are about 20 weeds that are of major economic importance, and if we can take even three of four off the list by biological controls, that would be a big step forward."

The area that seems to hold the most potential is plant pathogens — fungus, rusts, and bacteria that attack them.

Hay said the Regina station will be starting a program to identify and test plant pathogens that could be put to use in protecting Canadian food production.

"Using pathogens has a big potential. You can take two approaches (in control methods). You can bring the pathogen in and release the spores and let it go. Or you can take the spores from the pathogens and spray it on like you would a chemical herbicide."

The biological approach to insect control also involves the use of pathogens and of predatory insects that will clean the pests out of a field.

As well, work is now under way in the U.S. to control the reproduction of insect pests. Specially sterilized male insects are released in heavily infested areas, but the eggs produced will not hatch.

Research in sexual attractants

is also being carried out. The idea behind these attractants is that they will be manufactured in large quantities and sprayed over a wide area, confusing the insects' normal breeding instincts and totally disrupting their reproduction.

An alternative method for the use of these attractants is to lure the insects into traps where they will be killed.

Both the use of sterilized insects and sexual attractants have the advantage of being specific to only one species of insect.

Toxicology centre urged

by Nancy Russell

IT HAS TAKEN governments and the chemical industry too long to realize the need for fully trained toxicologists in Canada, according to Bruno Schieler of the Western College of Veterinary Medicine.

Toxicology is the study of the adverse effects of chemicals on living organisms, and Schieler, chairman of the toxicology group of the college of graduate studies and research, had been lobbying for a toxicology centre at the University of Saskatchewan since 1971.

For years people just didn't believe there could be serious effects from chemicals, but people are beginning to realize there are problems and those problems are not going away," he said in a recent interview.

Schieler said the chemicals foreign to nature introduced during the past few decades, such as pesticides, herbicides, drugs, food additives and other industrial products — are just beginning to receive thorough examination. This examination has led to more widespread use of epidemiology studies, as some of the products have been around long enough to show any adverse effects they may or may not have on people.

Establishing a toxicology centre or at least establishing more toxicologists at Canadian universities and research stations is an expensive proposition, but Schieler said it is an expense to which the Canadian public and politicians must address themselves.

"It is a slow process and taxpayers have to agree. But they must realize the number of toxic substances in the air, in the food chain and in the environment are not going away," he said.

John Oliver, a director of the Canadian Agriculture Chemicals Association, said the shortage of toxicologists is one of the most critical problems facing North America.

For further information or additional copies, please contact:

Saskatchewan Environment,
Public Information and
Education Branch,
5th Floor — 1855 Victoria Ave.,
Regina, Sask. S4P 3V5

Integrated control

THE ANSWER to effective crop protection in the future is integrated control of plant and animal pests; that is, control through the maximum use of biotic agents with chemicals, applied only as needed at defined damage thresholds. Specifically, through integrated control, we allow the biological forces already existing in nature to act in conjunction with properly timed uses of chemical pesticides, sex pheromones, sterile male release programs and other activities to limit damage to crops and threats to public health.

This type of control operates within two constraints. One is the use of specific viruses, bacteria, insect predators and parasites to kill pests. (This depends upon the availability of a certain density of the pest, enough time for effective attack, and applies as well to non-specific bioagents used.) The second constraint is that man-made pest control strategies are generally limited by economics, legislation and the paucity of basic research data required to manipulate and predict the situations being treated. In the final analysis, it is the degree of control desired that will largely determine the best type of control system for adequate crop protection, and the level of monitoring necessary to avoid undue side effects of pesticides on nontarget organisms.

For further research and study

Consider: Did you know that insects could be their own worst enemies? From your research identify areas where the biological control of pests has been highly successful. What other alternatives are there to the use of chemicals in pest control? What ways might a gardener control pests? How could a farmer reduce the use of chemical pesticides? Inquire into the type of pest control programs operating within your home area. Is the program mainly chemical, biological, or integrated?

Question: If funds available for research on pest control are limited, should the funds be used to find new chemicals or should biological controls be advanced? Who should decide how to use the research money — scientists, government, chemical manufacturers, or the public?

Suggestion: Develop a proposal for the future control of agricultural pests.

Suggestion: Redo the opinionnaire. Compare your answers. To what extent have your views changed? Which views were confirmed? What articles, evidence, or particular experiences led to these changes?

Glossary

Attractant — A substance that attracts destructive animals or insects, generally used with a killing agent or trap.

Biological control — The use of living things such as predators, parasites, or disease organisms to control pests.

Chemical — Substance obtained by or used in industry or agriculture, a compound such as DDT, or a mixture of compounds such as lime-sulphur.

DDT — An organic chemical compound which, as a persistent pesticide, has long lasting effects on food chains and environment.

Dioxins — Any of a family of toxic compounds known chemically as the dibenzo-para-dioxins. Dioxins may be found in a range of chemical processes, a number of which may involve the manufacture of agricultural chemicals.

Drift — The movement of material by air outside the intended target area during or shortly after application.

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Lethal — an agent which results in the death of the organism.

Nematode — A type of round worm often microscopic in size. Many species of nematodes are serious pests of plants and animals.

Pathogen — An organism or agent capable of causing disease.

Pest — Destructive, or troublesome thing. It includes such things as weeds, plant and animal diseases, some species of insects, mites, predator animals and rodents.

Pesticide — Any substance or mixture of substances, sold or presented for use in preventing, destroying, repelling or mitigating any insect, rodent, fungus weed or other form of plant or animal life or virus, except a virus, bacteria or fungus in living man or animals.

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Toxicity — The degree to which a substance is injurious to a plant or animal. Toxicity is quite distinct from hazard, which refers to the likelihood of injury, not to the injury itself.

Weeds — Plants that compete with man's crops for light, space, water and nutrients.

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by *Peter von Stackelberg*

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Research into sexual attractants

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Excerpted from *Pesticides: Their Implications for Agriculture*, Agriculture Canada, 1973

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Excerpted from "Toxicologists role claimed overlooked," *Saskatoon Star-Phoenix*, February 21, 1981

by *Nancy Russell*

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Public Information and
Education Branch,
5th Floor — 1865 Victoria Ave.
Regina, Sask. S4P 3V5